

What is claimed is:

1. A flip-chip light emitting diode package structure, comprising:  
a submount having a first surface and a second surface opposite to the first surface, a plurality of grooves on sidewalls of the submount;

5 a first patterned conductive film on a first part of the first surface, a first part of the second surface and on a part of an inner wall of the grooves;

a second patterned conductive film on a second part of the first surface, a second part of the second surface and a remaining part of the inner wall of the grooves; and

10 a light emitting diode (LED) chip on the submount, wherein the LED chip has two electrodes electrically connecting with the first and second patterned conductive films, respectively.

2. The flip-chip light emitting diode package structure of claim 1 further comprising two bumps disposed between the electrodes of the LED chip and the first  
15 patterned conductive film and the second patterned conductive film.

3. The flip-chip light emitting diode package structure of claim 1, wherein m is a number of the grooves that are on a first sidewall of the submount and n is a number of the grooves that are on a second sidewall of the submount.

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4. The flip-chip light emitting diode package structure of claim 3, wherein the first sidewall and the second sidewall are adjacent to each other.

5. The flip-chip light emitting diode package structure of claim 3, wherein the first sidewall and the second sidewall are opposite to each other.

6. The flip-chip light emitting diode package structure of claim 3, wherein m is  
5 not equal to n.

7. The flip-chip light emitting diode package structure of claim 3, wherein m is equal to n.

10 8. The flip-chip light emitting diode package structure of claim 3, wherein m is 1 and n is 1.

9. The flip-chip light emitting diode package structure of claim 1, wherein the grooves are on disposed on a sidewall at a corner of the submount.

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10. The flip-chip light emitting diode package structure of claim 1, wherein the bumps comprise a Sn-Pb alloy, a Sn-Au alloy or Au.

11. The flip-chip light emitting diode package structure of claim 1, wherein the  
20 submount comprises a material selected from the group consisting of aluminum nitride, boron nitride and zinc oxide.

12. A flip-chip light emitting diode package structure, comprising:

a submount having a first surface and a second surface opposite to the first surface, an indentation on the first surface, a plurality of grooves on a first sidewall and a second sidewall of the submount;

5 a first patterned conductive reflection film disposed on a first part of the first surface, a first part of the second surface, a first part of a sidewall of the indentation, a first part of a bottom of the indentation and a part of an inner wall of the grooves;

a second patterned conductive reflection film on a second part of the first surface, a second part of the second surface, a second part of the sidewall of the indentation and a second part of the bottom of the indentation, and a remaining part of the inner wall of  
10 the grooves; and

a light emitting diode (LED) chip inside the indentation of the submount, wherein the LED chip has two electrodes electrically connecting with the first patterned conductive film and the second patterned conductive film, respectively.

15 13. The flip-chip light emitting diode package structure of claim 12, further comprising two bumps disposed between the electrodes of the LED chip, and the first patterned conductive reflection film and the second patterned conductive reflection film.

20 14. The flip-chip light emitting diode package structure of claim 12, wherein m is a number of the grooves that are on the first sidewall of the submount and n is a number of the grooves that are on the second sidewall of the submount.

15. The flip-chip light emitting diode package structure of claim 14, wherein the first and the second sidewalls are next to each other.

16. The flip-chip light emitting diode package structure of claim 14, wherein the first and the second sidewalls are opposite to each other.

5           17. The flip-chip light emitting diode package structure of claim 14, wherein m is not equal to n.

18. The flip-chip light emitting diode package structure of claim 14, wherein m is equal to n.

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19. The flip-chip light emitting diode package structure of claim 14, wherein m is 1 and n is 1.

20. The flip-chip light emitting diode package structure of claim 12, wherein the  
15 grooves are disposed on a sidewall at a corner of the submount.

21. The flip-chip light emitting diode package structure of claim 12, wherein the bumps comprises a Sn-Pb alloy, a Sn-Au alloy or Au.

20           22. The flip-chip light emitting diode package structure of claim 12, wherein the submount comprises a material selected from the group consisting of aluminum nitride, boron nitride or zinc oxide.

23. The flip-chip light emitting diode package structure of claim 12, wherein an angle formed between the sidewall and the bottom of the indentation is an obtuse angle.